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REPORT

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COUNTRY Czechoslovakia

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SUBJECT Mechanical Cutting of Glass Envelopes  
for Vacuum Tubes

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The Czechoslovak electronics industry used plate-shaped glass die castings in production of glass tubes for small (low anode dissipation) all-glass vacuum tubes. The glass die castings were used to form the bottoms of the tubes and were sealed to the tube envelopes. These tubes, which were used in civilian broadcast receivers were produced in the following types: ECH 21, UCH 21, FBL 21, EF 22, and UBL 21. This designation of tubes conformed to the normal European designation of vacuum tubes of this type. About 100,000 units of all the types of this all-glass tube were produced annually in Czechoslovakia in 1950 and 1951.

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Originally, these tubes were produced in the Tesla-Hloubetin plant but the production was transferred from there to the Tesla Roznov pod Radhostem N 49-28, E 18-087 plant and to the Tesla Vrchlabi plant N 50-38, E 15-367 in the second half of 1949 and in the first half of 1950. Imports of these plate-shaped glass die castings decreased after 1948 and completely stopped at the beginning of 1950.

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with the decrease in glass die casting imports the production of all-glass vacuum tubes increased, and finally the Czechoslovak Tesla industry started the production of glass die castings of its own, sometime during the second half of 1949. As the production of plate-shaped glass die castings of the same form as those imported met serious difficulties

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it was decided to produce flat glass die castings instead. The material used was lead glass, the same material as

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for plate-shaped glass die castings. The castings were about three millimeters thick and of various diameters according to the type of tube. Only glass envelopes with a level and smooth bottom edge could be sealed to a flat glass die casting, while glass envelopes with a curled bottom edge were used for plate-shaped glass die castings. The bottom edge of the glass envelope was therefore ground in order to be level and smooth. However, this procedure proved to be expensive, long, and produced a large quantity of unuseable products (rejects), and therefore it was not a suitable method for mass production of the all-glass vacuum tubes. Consequently, in 1949, a new method of cutting the glass envelope to get a perfectly smooth and level edge was developed in the Tesla-Hloubetin plant. The glass envelope to be cut was put on a revolving spindle. A gas burner flame was set against the turning envelope on the spot where the envelope had to be cut. After three or four seconds, when the glass got sufficiently warm, a revolving copper disc with a sharp edge at the circumference was set against the envelope opposite the flame. The disc cooled the envelope at the point where it was to be cut and the envelope fractured there cleanly. The procedure was semi-automatic, operated by one woman worker, and took from six to eight seconds for one glass envelope. The edge was perfect and there were practically no unuseable products. This method proved satisfactory and was introduced in January 1950 in the glass factories, which then delivered the envelope to the Tesla plants in Roznov and Vrchlabi.

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the glass works at Polubny /N 50-46, E 15-20/ and at Nizbor, somewhere in the vicinity of Beroun /N 49-54, E 14-05/, produced these envelopes. These glass works were the only two factories for production of lead glass in Czechoslovakia. For a diagram of this cutting method, see Annex A7. This method for cutting glass envelopes was also applied in the production of miniature vacuum tubes

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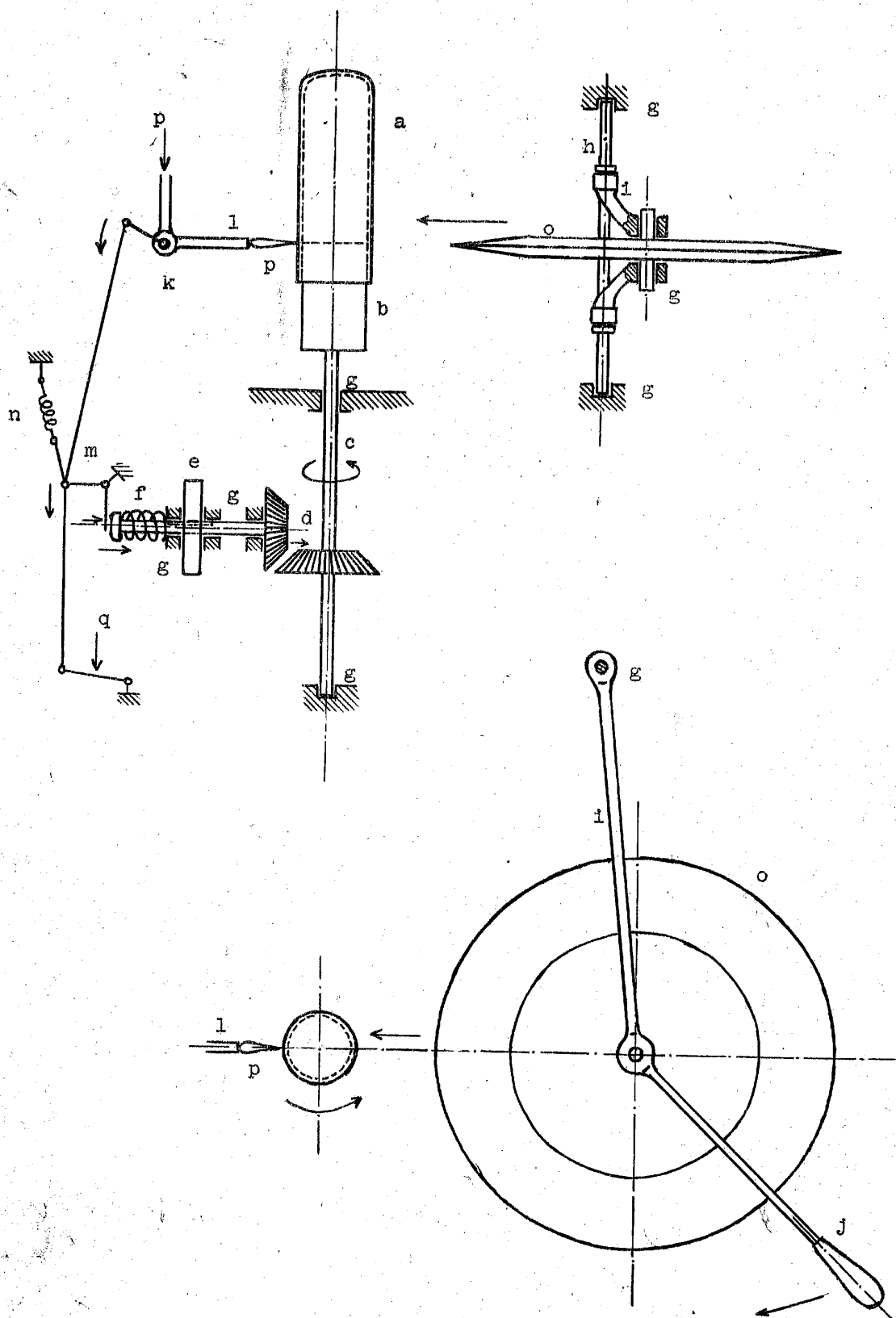
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Annex A



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Legend to Annex A

- a. The glass envelope to be cut.
- b. The spindle.
- c. Vertical shaft.
- d. Bevel gears.
- e. Driving gear.
- f. Compression spring.
- g. Bearings.
- h. Support arm shaft for copper disc.
- i. Support arm for copper disc.
- j. Hand lever for operating the copper disc.
- k. Gas-burner cock.
- l. Gas-burner.
- m. Connecting rod.
- n. Spring holding connecting rod in neutral position when not engaged in operation.
- o. Copper disc.
- p. Flame.
- q. Foot pedal.

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